IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of: Fui-Tseng H. Lee, Paul Nicholson

Application No.: 09/239,426 **Group Art Unit:** 1616
Reissue Application of: US 5,597,780

Filed: January 28, 1999 **Examiner:** S. Mark Clardy

For: Low Volatility Formulations of Microencapsulated Clomazone

BRIEF ON APPEAL

Paul A. Fair, Esquire
Reg. No. 35,866
FMC Corporation
1735 Market Street
Philadelphia, PA 19103
(215) 299-6723

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This is an Appeal from the Examiner's Final Rejection of Appellants' claims 1, 8, 15, 16, 19, 22-42, 48 and 49, the final rejection being dated January 23, 2003, with an Advisory Action being issued July 9, 2003. This Appeal Brief is being filed pursuant to 37 C.F.R. § 1.192. As requested in the Submission filed herewith, please charge all necessary extension of time fees and fees for this brief under 37 CFR § 1.17 (c), as well as any other fees necessary to maintain the pendency of this application, to Deposit Account # 06-1440.

REAL PARTY IN INTEREST

The real party in interest in this Appeal is FMC Corporation.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences that would directly affect or be directly affected by or have a bearing on the Board's decision in this Appeal.

STATUS OF CLAIMS

Claims 1-37 and 39-49 are pending in this reissue application. Claim 38 has been cancelled.[1] Claims 1, 8, 15, 16, 19, 22-42, 48 and 49 are rejected and are under appeal here;

[1] As background, the '780 patent contained fourteen claims as issued. Appellants' amended claims 1-14, as issued, and added new claims 15-47 when this reissue application was filed. A Preliminary Amendment was filed on May 27, 1999 wherein Appellants' requested cancellation of claims 22-47 and addition of new claims 48-64. However, after several conversations with the Examiner it was determined that the Preliminary Amendment was never matched to the file and, accordingly, the amendments requested therein were never made in the record. In an Amendment & Response to Office Action filed on February 22, 2001, Appellants' requested that the Preliminary Amendment not be entered into the record in order to expedite prosecution, and instead, Appellants' requested the entry of claims 48 and 49. In an Amendment & Response to Office Action filed on August 8, 2002, Appellants' requested that claim 38 be cancelled and that claims 2, 4, 6, 28, 37, 39 and 40 be amended.

claims 9-14, 21, and 43-47 are allowed; and claims 2-7, 17, 18 and 20 (dependent on a rejected claim) are objected to.

STATUS OF AMENDMENTS

No amendments have been filed in this application subsequent to the final rejection dated January 23, 2003.

SUMMARY OF INVENTION

Clomazone, the common name for 2-(2-chlorophenyl)methyl-4,4-dimethyl-3-isoxazolinone, a highly effective herbicide, is also highly volatile, so much so that clomazone applied to the soil in a target area may move to adjacent areas and there cause discoloration, most typically whitening or some degree of bleaching, of a variety of crops, trees, or decorative plants (see column 1, lines 11-17, of the '780 patent). While this bleaching, indicative of the mode of action of the herbicide, may be temporary when plants are exposed to sufficiently low concentrations, it is unwelcome, even when it does not result in the destruction of the plant (see column 1, lines 17-21, of the '780 patent). Accordingly, the label for the use of Command® 4EC Herbicide, an emulsifiable concentrate formulation in commercial use that contains four pounds of clomazone per gallon of formulation, lists a number of restrictions on how the product is to be used, including weather conditions, spray volume and pressure, and distance from areas where plants are in commercial production (see column 1, lines 21-27, of the '780 patent). The present invention relates to formulations of clomazone having reduced volatility relative to conventional emulsifiable concentrates of clomazone (see column 1, lines 6-7, of the '780 patent). In particular, it relates to microencapsulated formulations of clomazone having the

desired volatility in which the clomazone is encapsulated in a shell of polyurea (see column 1, lines 7-10 of the '780 patent).

ISSUES

The issues in this appeal are whether the Examiner has properly rejected Appellants':

(1) Claims 1, 8, 15, 16, 19, 22-42, 48 and 49 under 35 U.S.C. § 112, first paragraph, as based on a disclosure which is not enabling; and

(2) Claims 1, 8, 15, 16, 19, 22-42, 48 and 49 under 35 U.S.C.§ 112 second paragraph, as being incomplete for omitting essential elements.

GROUPING OF CLAIMS

All of the rejected claims on appeal here stand or fall together in regard to each of the two rejections above.

ARGUMENT

Appellants' respectfully submit that the foregoing rejections are improper and should be reversed based upon the reasons set forth herein below.

(1) Rejection of claims 1, 8, 15, 16, 19, 22-42, 48 and 49 under 35 USC § 112, first paragraph, as based on a disclosure which is not enabling.

The Examiner's position is essentially that the rejected claims are not enabled by the present specification and the knowledge existing in the art (at the time the application was filed), since such do not recite the presence of an antifoam agent. It is the Examiner's view that an

antifoam agent is a "required" or "critical" element of the present invention and, therefore, must be recited in all the claims. The Examiner does not cite any external reference material to demonstrate that undue experimentation would be required to make and use the present invention without an antifoam agent. Instead, the Examiner relies solely on Appellants' specification (i.e., col. 1, lines 56-60[2] and col. 2, lines 16-21[3] of the '780 patent) as teaching that the antifoam agent is "critical" or "required." The Examiner also argues that the antifoam agent is present in all the examples as further support for this position.

MPEP § 2164.04 states the following:

> In order to make a rejection, the examiner has the initial burden to establish a reasonable basis to question the enablement provided for the claimed invention...References should be supplied if possible to support a *prima facie* case of lack of enablement, but are not always required...However, specific technical reasons are always required.

Appellants' respectfully submit that one skilled in the art would be able to make and use the presently claimed invention (with or without an antifoam agent) without undue experimentation and that the Examiner has failed to satisfy his initial burden. Simply put, the specification, including the claims, does not state that the antifoam agent is "critical" or "essential" or "required" in order to make and use the present invention having the volatility reduction as compared to an emulsifiable concentrate.

First, it is maintained that the Examiner is misreading the specification. More specifically, it is recognized that the specification at col. 1, lines 56-60 discloses a process

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[2] Col. 1, lines 56-60 of the '780 patent state: "The process of the invention involves the following steps: (a) providing an aqueous phase containing an emulsion, preferably, a partially hydrolyzed polyvinyl alcohol; an antifoam agent, and optionally a xanthan gum viscosity modifier/stabilizer;..."

[3] Col. 2, lines 16-21 of the '780 patent state: "The aqueous phase will ordinarily contain 0.3 to 3.0, preferably, 0.8 to 2.0, weight percent of one or more emulsifiers, e.g., polyvinyl alcohol, 0.05 to 0.20, preferably 0.06 to 0.15, weight percent of the xanthan gum viscosity modifier/stabilizer, if it is used, and 0.1 to 1.0, preferably, 0.4 to 0.9, weight percent of the antifoam agent."

embodiment of the invention containing an antifoam agent. However, this embodiment does not state that the antifoam agent MUST ALWAYS be present in every inventive process– it merely states that it is present in that embodiment. It is also recognized that the specification discloses at col. 2, lines 16-21, that the aqueous phase will "ordinarily" contain an antifoam agent, but this again does not mean that it MUST ALWAYS contain an antifoam agent – on the contrary, it clearly and unambiguously infers that the antifoam agent does NOT have to be present in all cases. Furthermore, the fact that the Examples all use an antifoam agent does not necessarily mean that the invention must use an antifoam agent for the same reasons – indeed, nothing in the examples indicates that the antifoam agent MUST be used.

Second, while the specification nowhere states or clearly suggests that the antifoam agent is "critical" or "required" or "essential" to making and using the invention without undue experimentation, Appellants maintain that it is clear from claim 1 as originally filed that the antifoam agent was considered to be an optional component at the time this application was originally filed. That is, claim 1 granted in the '780 patent as originally filed on September 21, 1995 and states, in part:

> ...a) providing an aqueous phase containing 0.3 to 3.0 wt. % of one or more emulsifiers; optionally 0.02 to 0.20 wt. % of a xanthan gum viscosity modifier/stabilizer, and 0.1 to 1.0 wt. % of an antifoam agent; ...

The semicolon and comma in the above are important to properly interpreting the meaning of the claim on this issue. It is respectfully submitted that the proper way to interpret claim 1 and the use of the semicolon and the comma above is that the semicolon communicates the break between the required components and the optional components in the aqueous phase.

If this were not true, why then was the semicolon used? If the antifoam agent is "critical" or "essential" or "required", why does it not precede the semicolon rather than follow it? In addition, nothing in the specification or file wrapper states that such is "critical" or "essential" or "required" in order to make and use the present invention. *It is respectfully submitted that the plain meaning of claim 1 is that the antifoam agent is an optional component.*

The Examiner appears to consider this argument (e.g., see page 4 of the Final Rejection), but discounts such because of the Examiner's contention that the above reading is in "clear contradiction to the rest of the specification" and that it "would be inappropriate to rely solely on punctuation" under such circumstances.

Appellants' are not ignoring the teachings in the remainder of the specification. Rather, Appellants' do not agree with the Examiner's view that the above plain meaning of claim 1 is clearly inconsistent with the specification or the Examiner's inference that the above plain meaning is obviously not what was intended by Appellants' when this case was filed. Appellants' acknowledge that the examples in the specification contain an antifoam agent and that there are numerous embodiments of the present invention describing the use of an antifoam agent in the formulation and process (e.g., col. 1, lines 56-60 and col. 2, lines 16-21). However, nowhere in the specification does it state that the antifoam agent is "critical" or "essential" or "required" to making or using the present invention or any language whatsoever stating that the formulation of this invention would not work if the antifoam agent is not present. These words and meanings are not used or suggested. Merely listing a component as being present does not mean the component is "critical" or "essential" or "required" to making and using the present invention and it is not correct to infer that this is necessarily the case.

Furthermore, this rejection is based on an alleged lack of enablement; i.e., that one skilled in the art would not be able to make and use the present invention containing no antifoam agent without undue experimentation. It is respectfully requested that the Examiner consider what it is that the antifoam agent is doing in the present invention. Antifoam agents are generally inert (such as the antifoam agent disclosed in the specification). The antifoam agents are generally added to the formulation in order to prevent foaming in the tank when the formulation is mixed with water by the farmer. Its absence would not require undue experimentation to prepare and use a formulation having the recited volatility. Appellants' advise that the present invention could readily be made and used without an antifoam agent and all that is required here is to simply leave it out. The present specification is not inconsistent with this point, and the Examiner has not provided one external reference to demonstrate that the use of antifoam agents in herbicidal formulations is an unpredictable art.

In summary, it is respectfully submitted that the plain meaning of claim 1 is that the antifoam agent is an optional component; nowhere in the specification do Appellants state that the antifoam agent is "critical" or "required" or "essential" to making or using the present invention without undue experimentation; and the Examiner's improper inferences from two portions of the specification and the Examples are not a sufficient basis to take an opposite view of the plain meaning of claim 1.

In view of the foregoing, it is respectfully submitted that the present claims are fully enabled by the specification and the knowledge and skill in the art and that the Examiner has failed to show why one skilled in the art would not be able to make and use the present invention containing no antifoam agent without undue experimentation. Reversal is respectfully requested.

(2) Rejection of claims 1, 8, 15, 16, 19, 22-42, 48 and 49 under 35 USC § 112, second paragraph, as being incomplete for omitting essential elements; i.e. the antifoaming agent.

The Examiner's position is that the antifoaming agent is an omitted essential element for the reasons set forth above; i.e., the specification teaches that the antifoaming agent is an "essential" element and that claim 1, as originally filed, is not inconsistent with this interpretation. Appellants' respectfully submit that this rejection is improper and should be reversed for the same reasons provided hereinabove. That is, for the reasons immediately above, the specification does not teach that the antifoam agent is an "essential" element. Moreover, as discussed above, claim 1, as originally filed, recites that the antifoam agent is an optional component. In view of the foregoing reasons, reversal of this rejection if respectfully requested.

CONCLUSION

For the reason set forth hereinabove, Appellants' respectfully submit that claims 1, 8, 15, 16, 19, 22-42, 48 and 49 are in full compliance with the requirements of 35 USC § 112, first and second paragraphs. Accordingly, reversal of the Examiner's rejections by this honorable board it is respectfully requested.

Respectfully submitted,

Paul A. Fair

Paul A. Fair
Reg. No. 35,866

FMC Corporation
1735 Market Street
Philadelphia, PA 19103
T-(215) 299-6723
F-(215) 299-6984

Date: September 18, 2003

APPENDIX

We Claim:

1. A process for the preparation of herbicidally effective formulations of clomazone having a volatility less than fifty percent of the volatility of an emusifiable concentrate of clomazone containing four pounds of clomazone per gallon of formulation which comprises microencapsulating the clomazone by interfacial polymerization by the steps of:

a) providing an aqueous phase containing 0.3 to 3.0 wt. % of one or more emulsifiers; [optionally 0.02 to 0.20 wt. % of a xanthan gum viscosity modifier/stabilizer, and 0.1 to 1.0 wt. % of an antifoam agent;]

b) providing a water immiscible phase consisting of clomazone, polymethylene polyphenyl isocyanate (PMPPI), and a hydrocarbon solvent; the weight ratio of clomazone to PMPPI being in the range of 1:1 to 6:1;

c) emulsifying the water immiscible phase in the aqueous phase, forming a dispersion of water immiscible droplets throughout the aqueous phase;

d) agitating the dispersion while adding thereto an aqueous solution of 15 to 100 weight percent of at least one polyfunctional amine selected from ethylenediamine (EDA), diethyltriamine (DETA), triethylenetetramine (TETA), and 1, 6-hexanediamine (HDA), with the proviso that (EDA) is used only in a mixture, the weight ratio of polyfunctional amine to PMPPI being in the range of 0.1:1 to 1:1, thus forming microcapsules having a polyurea shell wall around the water immiscible droplets; and

e) curing the microcapsules by continuing the agitation while heating the dispersion at a temperature in the range of 35° to 60° C. for a period of 3 to 10 hours to produce a formulation in which the average size of the microcapsules is in the range of 5 to 50 microns [;

f) optionally adjusting the pH to between 6.5 and 9.0].

2. A process according to claim 1 in which the emulsifier is a polyvinyl alcohol; [the antifoam agent is a] said aqueous phase further contains 0.1 to 1.0 wt. % of a polydimethyl siloxane; the ratio of clomazone to PMPPI is 4.5:1 to 4.7:1; the polyamine is a mixture of TETA and HDA in which the ratio of TETA and HDA is 3:1 to 1:3; the microcapsules are cured at 45° to 50° C. for 4 to 5 hours and have an average size of 5 to 30 microns.

3. A process of claim 2 in which there is added to the formulation after completion of the curing step one or more stabilizers selected from 0.05 to 0.30 wt. % xanthan gum, 0.75 to 6.5 wt. % propylene glycol, 0.5 to 6.0 wt. % one or more surfactants, and 0.25 to 0.50 wt. % smectite clay, to adjust the viscosity to 1700 to 3800 cps and the suspensibility to greater than 70%, each weight percent relative to the weight of the formulation after addition of the stabilizers.

4. A process according to claim 1 in which the emulsifier is a polyvinyl alcohol; [the antifoam agent is a] said aqueous phase further contains 0.1 to 1.0 wt. % of a polydimethyl siloxane; the ratio of clomazone to PMPPI is 4.5:1 to 4.7:1; the polyamine is a mixture of DETA

and HDA in which the ratio of DETA to HDA is 3:1 to 1:3; the microcapsules are cured at 45° to 50° C. for 4 to 5 hours and have an average size of 5 to 30 microns.

5. A process of claim 3 in which the amounts of stabilizers added are 0.05 to 0.25 xanthan gum and 1.0 to 6.0 propylene glycol.

6. A process according to claim 1 in which the emulsifiers are a polyvinyl alcohol [and, optionally a sodium salt of sulfonated naphthalene condensate]; [the antifoam agent is a] said aqueous phase further comprises 0.1 to 1.0 wt.% of a polydimethyl siloxane; the ratio of clomazone to PMPPI is 4.5:1 to 4.7:1; the polyamine is DETA, the microcapsules are cured at 45° to 50° C. for 4 to 5 hours and have an average size of 5 to 30 microns.

7. An herbicidal formulation prepared according to any one of claims 1 through 6.

8. A process for the preparation of herbicidally effective formulations of clomazone having a volatility less than fifty percent of the volatility of an emusifiable concentrate of clomazone containing four pounds of clomazone per gallon of formulation which comprises microencapsulating the clomazone by interfacial polymerization by the steps of:

a) providing an aqueous phase containing 0.5 to 3.0 wt. % of one or more emulsifiers; [optionally 0.05 to 0.20 wt. % of a xanthan gum viscosity modifier/stabilizer, and 0.3 to 1.0 wt. % of an antifoam agent;]

b) providing a water immiscible phase consisting of clomazone, polymethylene polyphenyl isocyanate (PMPPI), and a hydrocarbon

solvent; the weight ratio of clomazone to PMPPI being in the range of 1:1 to 6:1;

c) emulsifying the water immiscible phase in the aqueous phase, forming a dispersion of water immiscible droplets throughout the aqueous phase;

d) agitating the dispersion while adding thereto at least one polyfunctional amine selected from diethyltriamine (DETA), triethylene-tetramine (TETA) and 1,6-hexanediamine (HDA), the weight ratio of polyfunctional amine to PMPPI being in the range of 0.1:1 to 1:1, thus forming microcapsules having a polyurea shell wall around the water immiscible droplets; and

e) curing the microcapsules by continuing the agitation while heating the dispersion at a temperature in the range of 35° to 60° C. for a period of 3 to 10 hours [;

f) optionally adjusting the pH to between 6.5 and 9.0].

9. An herbicidal [composition] formulation containing from 1 to 4 pounds of clomazone per gallon of formulation and having a volatility less than fifty percent of the volatility of an emusifiable concentrate of clomazone containing four pounds of clomazone per gallon of formulation, comprising:

a) an aqueous suspension of microcapsules made up of a polyurea shell surrounding a core of clomazone and a minor amount of a hydrocarbon solvent, the polyurea having been formed from the interfacial reaction of polymethylene polyphenyl isocyante (PMPPI) with ethylenediamine

(EDA), diethylenetramine (DETA), triethylenetetramine (TETA), or 1,6-hexanediamine (HDA), or a mixture of the polyfunctional amines, with the proviso that EDA is used only in a mixture;

b) 0.2 to 1.00 wt. % polyvinyl alcohol;

c) 0.1 to 0.5 wt. % antifoam agent; and

d) [optionally 0.07 to 0.30 wt. % xanthan gum viscosity modifier/stabilizer; and

e)] 0.75 to 7.0 wt. % propylene glycol, the average size of the microcapsules being in the range of 5 to 50 microns and having a suspensibility of greater than 70%, a viscosity of 1700 to 3800 cps, and a 100 mesh wet screen analysis of greater than 99.95%.

10. A [composition] formulation of claim 9 containing two pounds of clomazone per gallon of formulation, in which the weight ratio of clomazone to PMPPI is 4.5:1 to 4.7:1 and the polyfunctional amines are TETA and HDA, with the weight ratio of TETA to HDA 3:1 to 1:3.

11. A [composition] formulation of claim 9 containing two pounds of clomazone per gallon of formulation, in which the weight ratio of clomazone to PMPPI is 4.5:1 to 4.7:1 and the polyfunctional amines are TETA and DETA, with the weight ratio of TETA to DETA 3.1 to 1:3.

12. A [composition] formulation of claim 9 containing two pounds of clomazone per gallon of formulation, in which the weight ratio of clomazone to PMPPI is 4.5:1 to 4.7:1 and the polyfunctional amines are DETA and HDA, with the weight ratio of DETA to HDA 3:1 to 1:3.

13. A [composition] formulation of claim 9 containing three pounds of clomazone per gallon of formulation, in which the weight ratio of clomazone to PMPPI is 4.5:1 to 4.7:1 and the polyfunctional amine is DETA.

14. A [composition] formulation of claim 13 in which the pH is adjusted to between 6.5 and 9.0.

15. The process for the preparation of clomazone formulations of claim 1 further comprising:

f. adjusting the pH of the cured microcapsule dispersion to between 6.5 and 9.0.

16. The process for the preparation of clomazone formulations of claim 1, wherein the aqueous phase of step a) comprises 0.02 to 0.20 wt. % of a xanthan gum viscosity modifier/ stabilizer.

17. The process for the preparation of clomazone formulations of claim 16, wherein the aqueous phase of step a) further comprises 0.1 to 1.0 wt. % of an antifoam agent.

18. The process according to claim 6 in which the emulsifiers comprise a polyvinyl alcohol and a sodium salt of sulfonated naphthalene condensate.

19. The process for the preparation of clomazone formulations of claim 8 further comprising:

f. adjusting the pH of the cured microcapsule dispersion to between 6.5 and 9.0.

20. The process for the preparation of clomazone formulations of claim 8, wherein the aqueous phase of step a) comprises 0.05 to 0.20 wt. % of a xanthan gum viscosity modifier/stabilizer, and 0.3 to 1.0 wt. % of an antifoam agent.

21. The herbicidal formulation of claim 9, further comprising:

e) 0.07 to 0.30 wt. % xanthan gum viscosity modifier/stabilizer.

22. An herbicidal formulation comprising an aqueous suspension of microcapsules, wherein said microcapsules comprise a polyurea shell and encapsulated material comprised of an herbicidally effective amount of clomazone and a hydrocarbon solvent,

wherein the formulation has a clomazone volatility less than the volatility of an emusifiable concentrate of clomazone containing a corresponding concentration of clomazone.

23. The herbicidal formulation of claim 22, wherein the clomazone volatility is less than fifty percent that of the emulsifiable concentrate of clomazone.

24. The herbicidal formulation of claim 22, wherein the formulation has from 1 to 4 pounds of clomazone per gallon of formulation.

25. The herbicidal formulation of claim 24, wherein the average size of the microcapsules ranges from 5 to 50 microns.

26. The herbicidal formulation of claim 25, wherein the formulation has a suspensibility of greater than 70%

27. The herbicidal formulation of claim 26, wherein the formulation has a viscosity of 1700 to 3800 cps.

28. The herbicidal formulation of claim 27, wherein the formulation has a 100 mesh wet screen analysis of greater than 99.95%.

29. The herbicidal formulation of claim 22, wherein the average size of the microcapsules ranges from 5 to 30 microns.

30. The herbicidal formulation of claim 22, wherein the encapsulated material comprises 60 to 85 weight percent clomazone.

31. A process for the preparation of an herbicidally effective formulation of clomazone which comprises the steps of:

a) providing an aqueous phase;

b) providing a water immiscible phase comprising clomazone, polymethylene polyphenyl isocyante (PMPPI), and a hydrocarbon solvent, wherein the amount of clomazone is sufficient to provide an herbicidally effective concentration in the product formulation;

c. emulsifying the water immiscible phase in the aqueous phase, forming a dispersion of water immiscible droplets throughout the aqueous phase;

d agitating the dispersion while adding thereto an aqueous solution of at least one polyfunctional amine, thus forming microcapsules having a polyurea shell wall around the water immiscible droplets; and

e. curing the microcapsules,

thereby obtaining an aqueous suspension of microparticles containing an herbicidally effective concentration of clomazone and having the volatility less than the volatility of an emusifiable concentrate of clomazone containing a corresponding concentration of clomazone.

32. The process of claim 31, wherein the clomazone volatility is less than fifty percent of the emulsifiable concentrate of clomazone.

33. The process of claim 31, wherein the suspension has from 1 to 4 pounds of clomazone per gallon of formulation.

34. An herbicidal formulation comprising an aqueous suspension of microcapsules wherein said microcapsules comprise a polyurea shell and encapsulated material comprised of an herbicidally effective amount of clomazone and a hydrocarbon solvent, the polyurea having been formed from the interfacial reaction of polymethylene polyphenyl isocyanate (PMPPI) with one or more polyfunctional amines,

wherein the formulation has a clomazone volatility less than the volatility of an emusifiable concentrate of clomazone containing a corresponding concentration of clomazone.

35. The clomazone formulation of claim 34, wherein the polyfunctional amine is selected from the group consisting of ethylenediamine (EDA), diethyltriamine (DETA), triethylenetetramine (TETA), and 1,6-hexanediamine (HDA), with the proviso that (EDA) is used only in a mixture.

36. The clomazone formulation of claim 34, wherein the formulation has from 1 to 4 pounds of clomazone per gallon of formulation.

37. A microencapsulated clomazone formulation comprising a polyurea shell, whereby said polyurea shell substantially reduces the volatility of clomazone.

38. (Cancelled)

39. The microencapsulated clomazone formulation of claim 37, wherein said polyurea shell is formed by interfacial polymerization of polymethylene polyphenyl isocyanate and a poly functional amine.

40. (Amended). The microencapsulated clomazone formulation of claim 39, wherein the polyfunctional amine is selected from the group consisting of ethylenediamine (EDA), diethyltriamine (DETA), triethylenetetramine (TETA), and 1,6-hexanediamine (HDA), with the proviso that (EDA) is used only in a mixture.

41. The clomazone formulation of claim 33, wherein the encapsulated material comprises 60 to 85 weight percent clomazone.

42. The clomazone formulation of claim 33, wherein the volatility of the formulation is reduced compared to an emusifiable concentrate of clomazone containing a corresponding concentration of clomazone, such that when the formulation is applied to a target area, injury to plants in areas adjacent to the target area is significantly reduced.

43. A process for the preparation of a herbicidally effective formulation of clomazone which comprises microencapsulating clomazone by the steps of:

a) providing an aqueous phase containing an effective amount of one or more emulsifiers, and an effective amount of an antifoam agent;

b) providing a water immiscible phase consisting of clomazone, polymethylene polyphenyl isocyanate (PMPPI), and a hydrocarbon solvent;

c) emulsifying the water immiscible phase in the aqueous phase, forming a dispersion of water immiscible droplets throughout the aqueous phase;

d) agitating the dispersion while adding thereto an aqueous solution of at least one polyfunctional amine selected from ethylenediamine (EDA), diethyltriamine (DETA), triethylenetetramine (TETA), and 1,6-hexanediamine (HDA), with the proviso that (EDA) is used only in a mixture, thus forming microcapsules having a polyurea shell wall around the water immiscible droplets; and

e) curing the microcapsules by continuing the agitation while heating the dispersion to produce a formulation in which the average size of the microcapsules is in the range of 5 to 50 microns,

thereby obtaining a aqueous suspension of microparticles containing from 1 to 4 pounds of clomazone per gallon of formulation and having a volatility less than fifty percent of the volatility of an emusifiable concentrate of clomazone containing a corresponding concentration of clomazone.

44. The process of claim 43, wherein step d comprises:

d') agitating the dispersion while adding thereto at least one polyfunctional amine selected from diethyltriamine (DETA), triethylene-tetramine (TETA) and 1,6-hexanediamine (HDA).

45. The process of claim 43, wherein step d comprises:

d') agitating the dispersion while adding thereto 1,6-hexanediamine (HDA).

46. The process of claim 43, wherein the suspension has from 1 to 4 pounds of clomazone per gallon of formulation.

47. The process for the preparation of a herbicidally effective formulation of clomazone claim 43, wherein the volatility of the formulation obtained is reduced compared to an emusifiable concentrate of clomazone containing a corresponding concentration of clomazone, such that when the formulation is applied to a target area, injury to plants in areas adjacent to the target area is significantly reduced.

48. An herbicidal composition of microencapsulated clomazone comprising: a polyurea shell forming microcapsules and encapsulated material within said shell; said encapsulated material comprising an herbicidally effective amount of clomazone; wherein said composition has a clomazone volatility less than the volatility of an emulsifiable concentrate of clomazone containing a corresponding concentration of clomazone.

49. A process for the preparation of an herbicidally effective clomazone composition comprising microencapsulating clomazone by interfacial polymerization to form plural cured microcapsules comprising a polyurea shell wall surrounding encapsulated material comprising clomazone, wherein said herbicidally effective clomazone composition has a clomazone volatility less than that of an emulsifiable concentrate of clomazone containing a corresponding concentration of clomazone.